Déclaration d'intérêts de Eric Fontaine

- Activités de conseil, fonctions de gouvernance, rédaction de rapports

  Baxter

- Essais cliniques, autres travaux, communications de promotion

  Fresenius, Nutricia, Aguettant

- Intérêts financiers (actions, obligations)

  Non

- Liens avec des personnes ayant des intérêts financiers ou impliquées dans la gouvernance

  Non

- Réception de dons sur une association dont je suis responsable

  AGEN

- Perception de fonds d'une association dont je suis responsable et qui a reçu un don

  Non

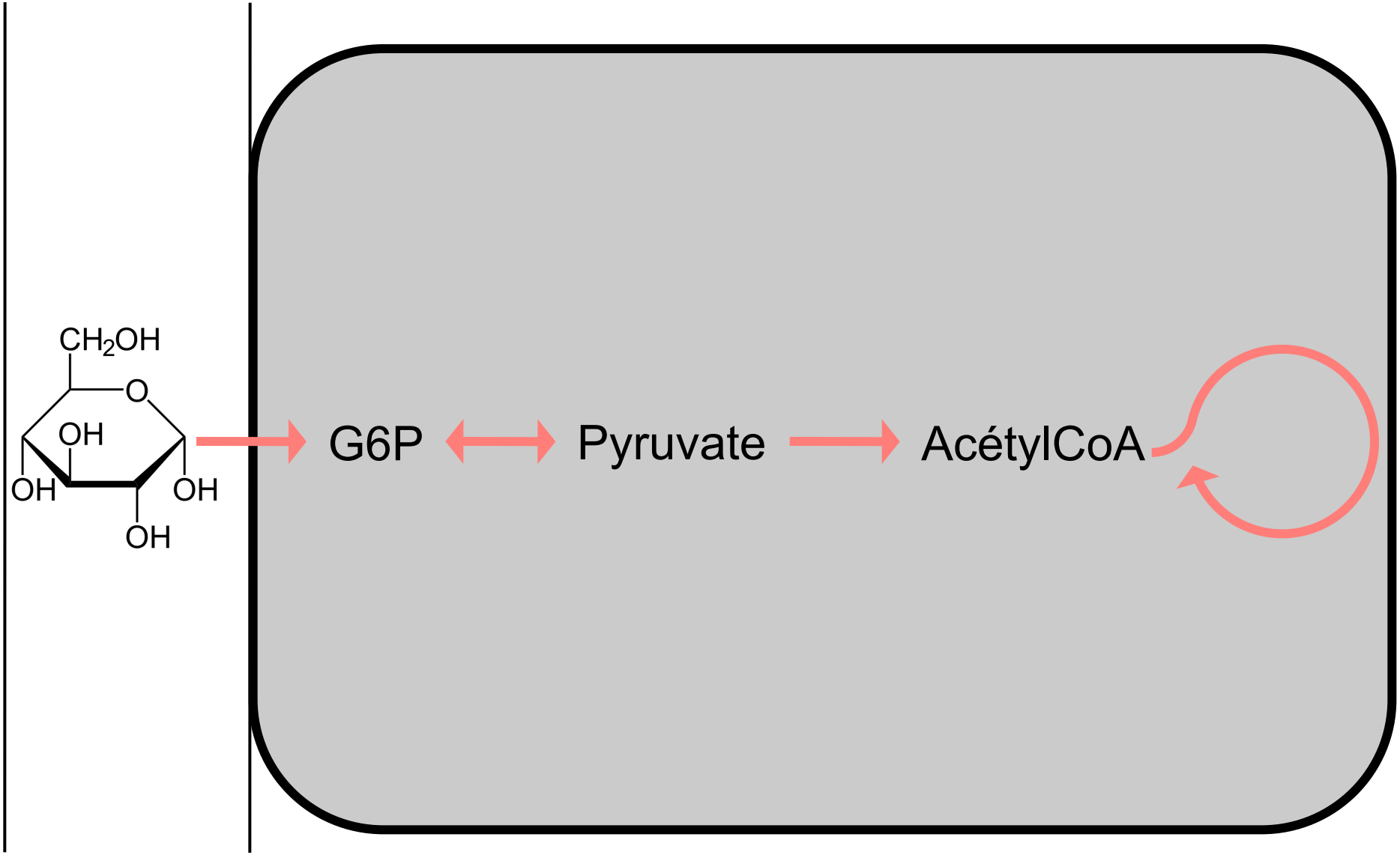
- Détention d'un brevet, rédaction d'un ouvrage utilisé par l'industrie

  Non

Métabolisme du glucose

Pr. Eric Fontaine
Clinique de Nutrition Artificielle - CHU de Grenoble
INSERM U 1055 - Université Joseph Fourier - Grenoble

Devenir du Glucose

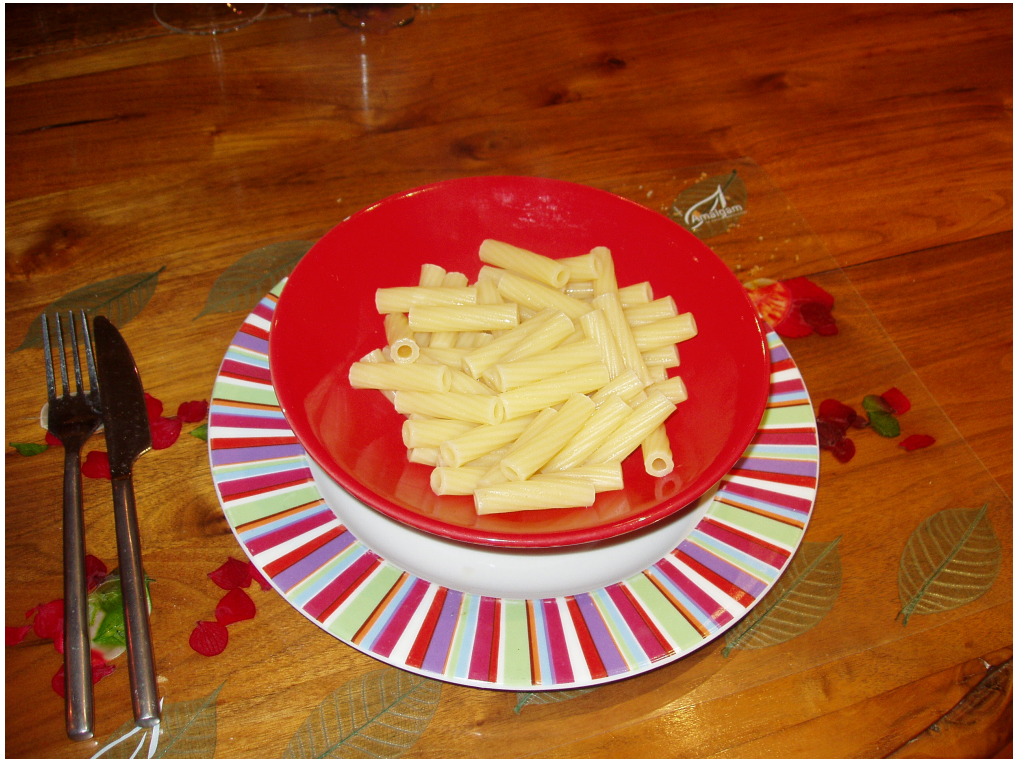


Capacité maximale d’oxydation du glucose

- 4 mg X kg / min
- 4 mg X votre poids pour 1 min
- 4 mg X votre poids X 60
  - pour 1 heure
- 4 mg X votre poids X 60 pour 1 heure / 1000
  - pour avoir le résultat en gramme / heure

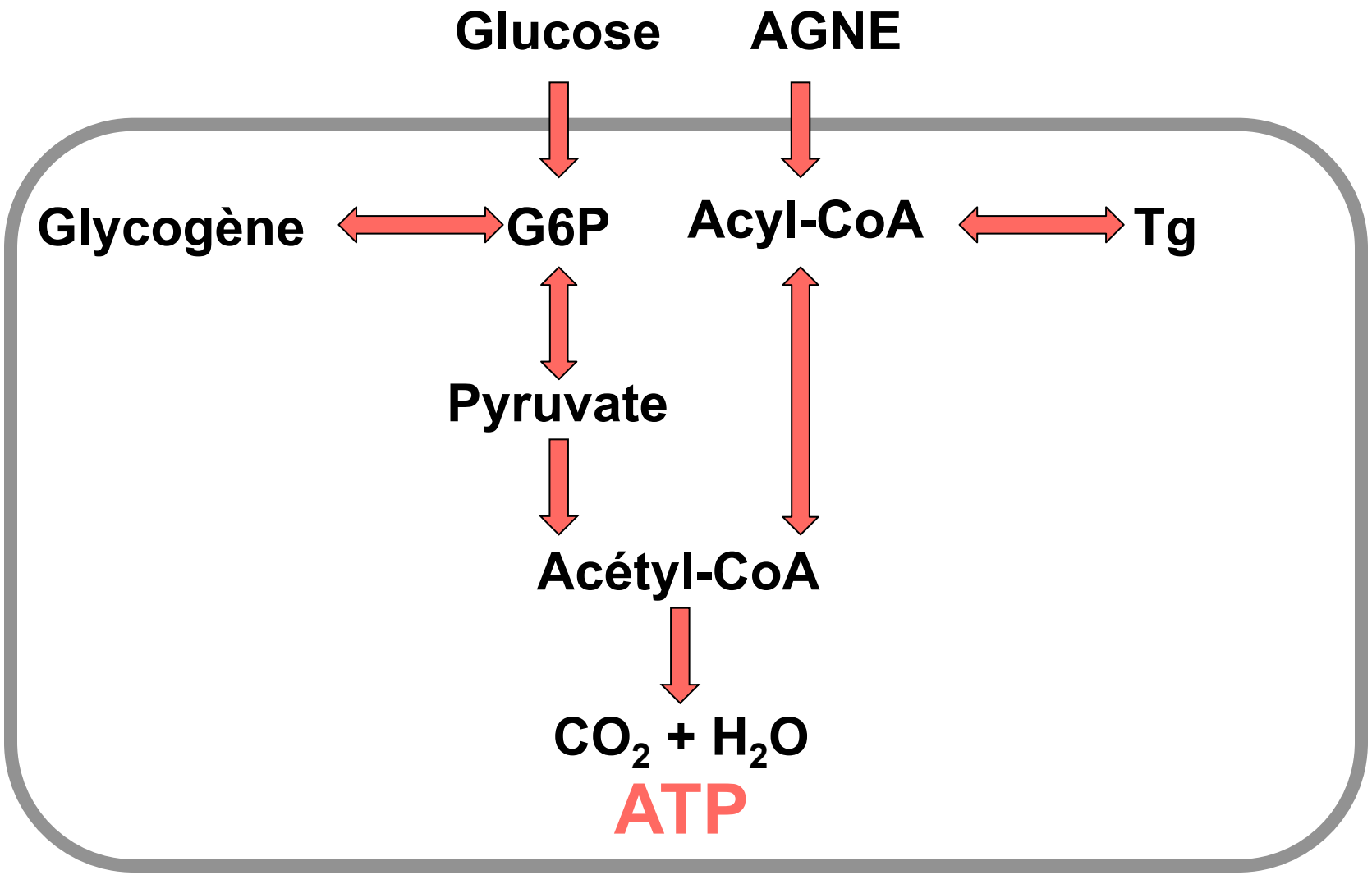
$$4 \times 75 \times 60 / 1000 = 18$$

Dois-je manger ça …

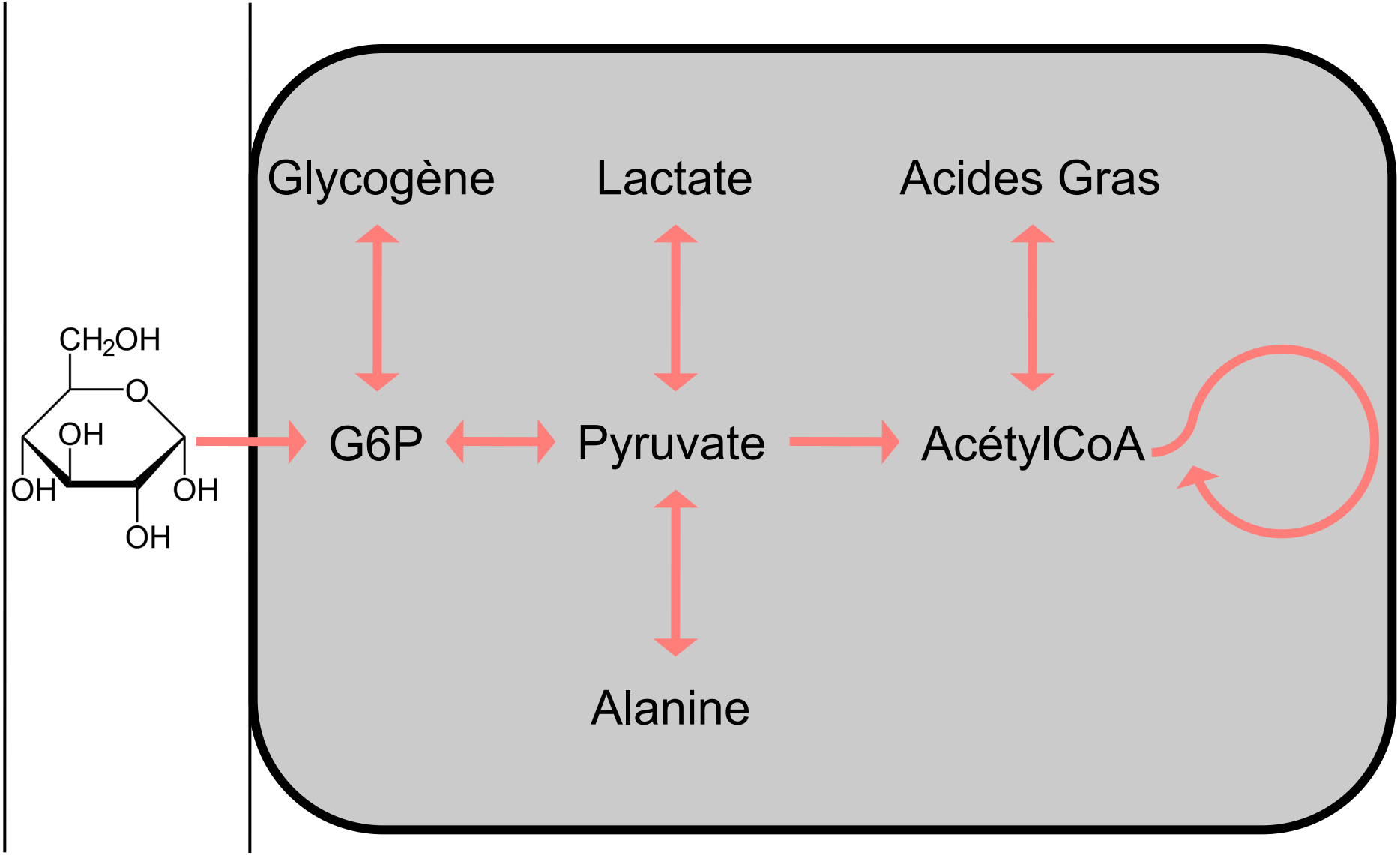


… en 5 heures et 33 minutes ?

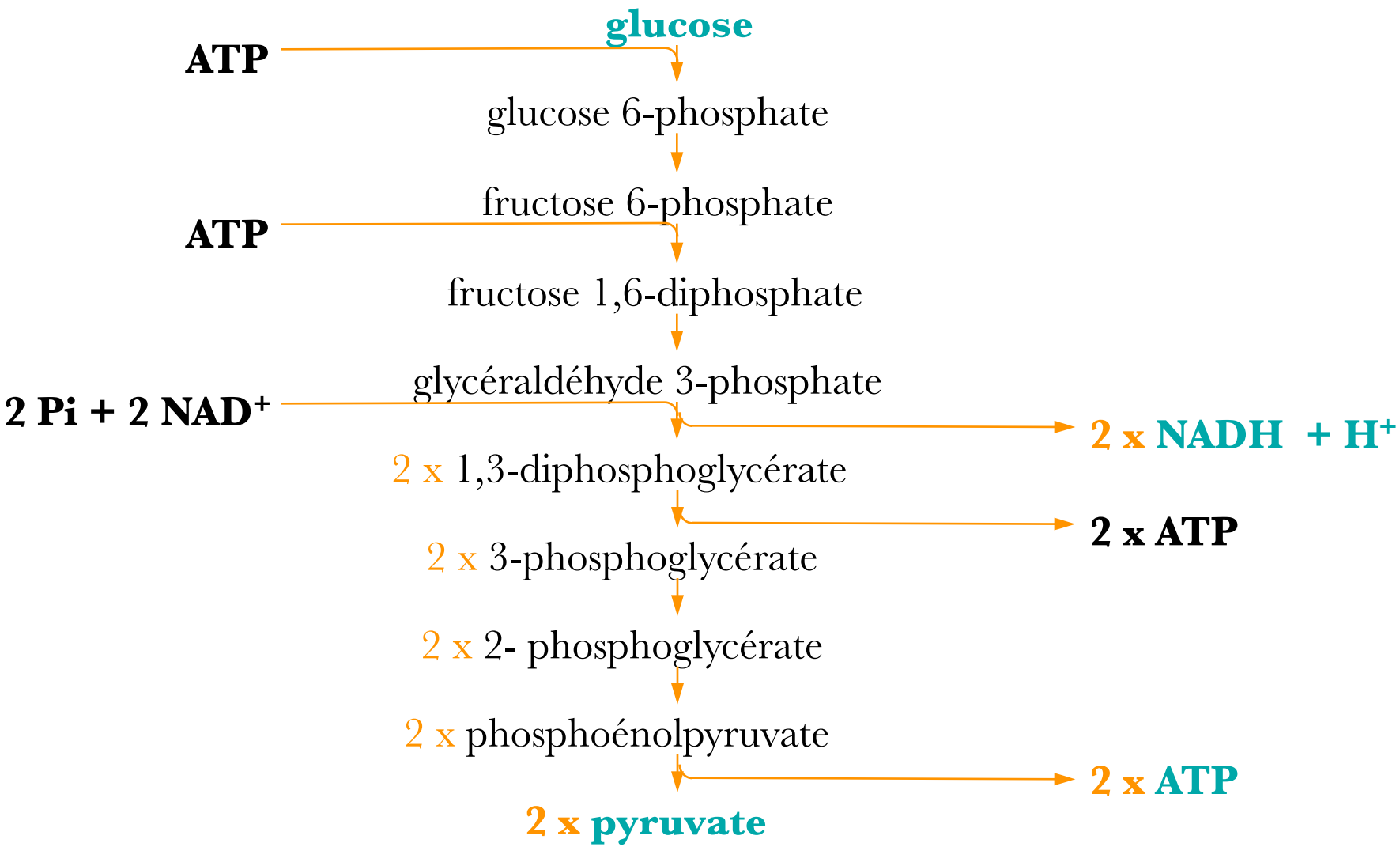
Utiliser or mettre en réserve ?



Devenir du Glucose



Glycolyse


glucose
ATP
glucose 6-phosphate
fructose 6-phosphate
ATP
fructose 1,6-diphosphate
glycéraldéhyde 3-phosphate
2 Pi + 2 NAD+
2 x NADH + H+
2 x 1,3-diphosphoglycérate
2 x ATP
2 x 3-phosphoglycérate
2 x 2- phosphoglycérate
2 x phosphoénolpyruvate
2 x ATP
2 x pyruvate

Glycolyse

1 glucose

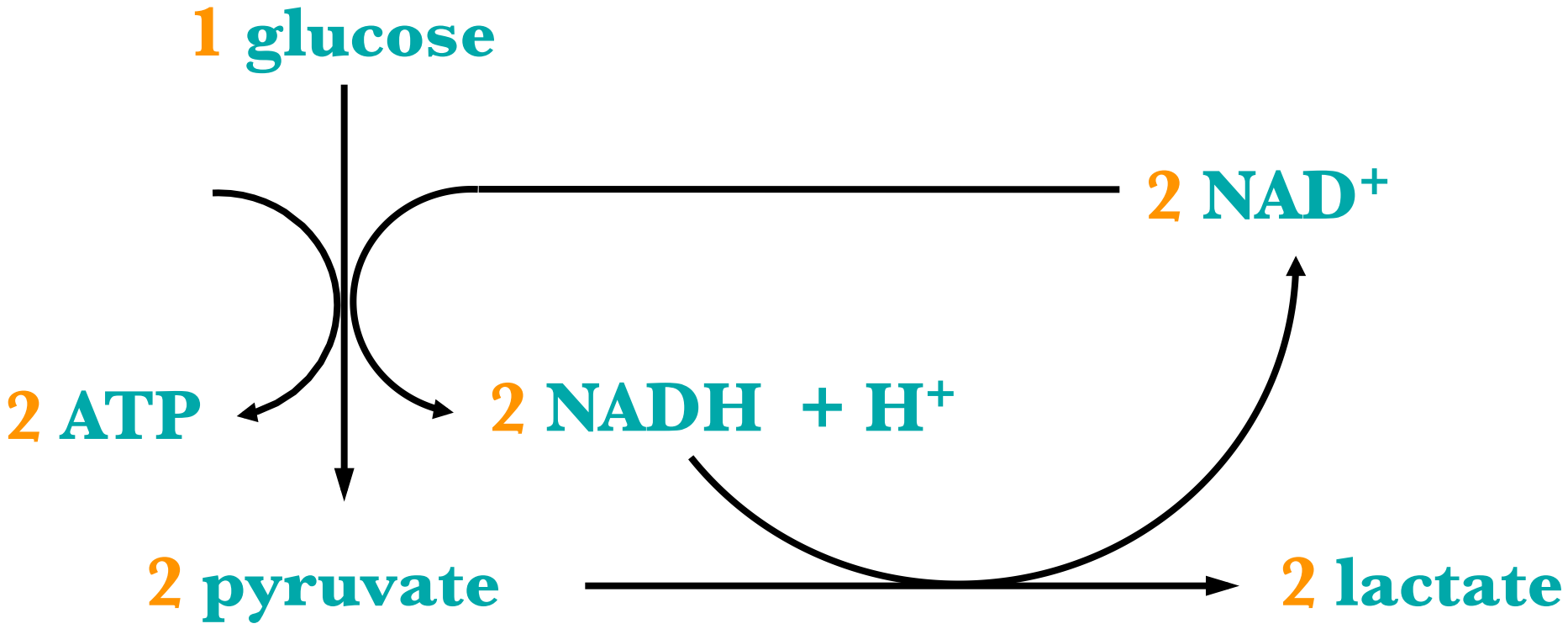
↓

2 pyruvate

2 NADH + H^+

2 ATP

Glycolyse et potentiel Redox



Néoglycogenèse

1 glucose

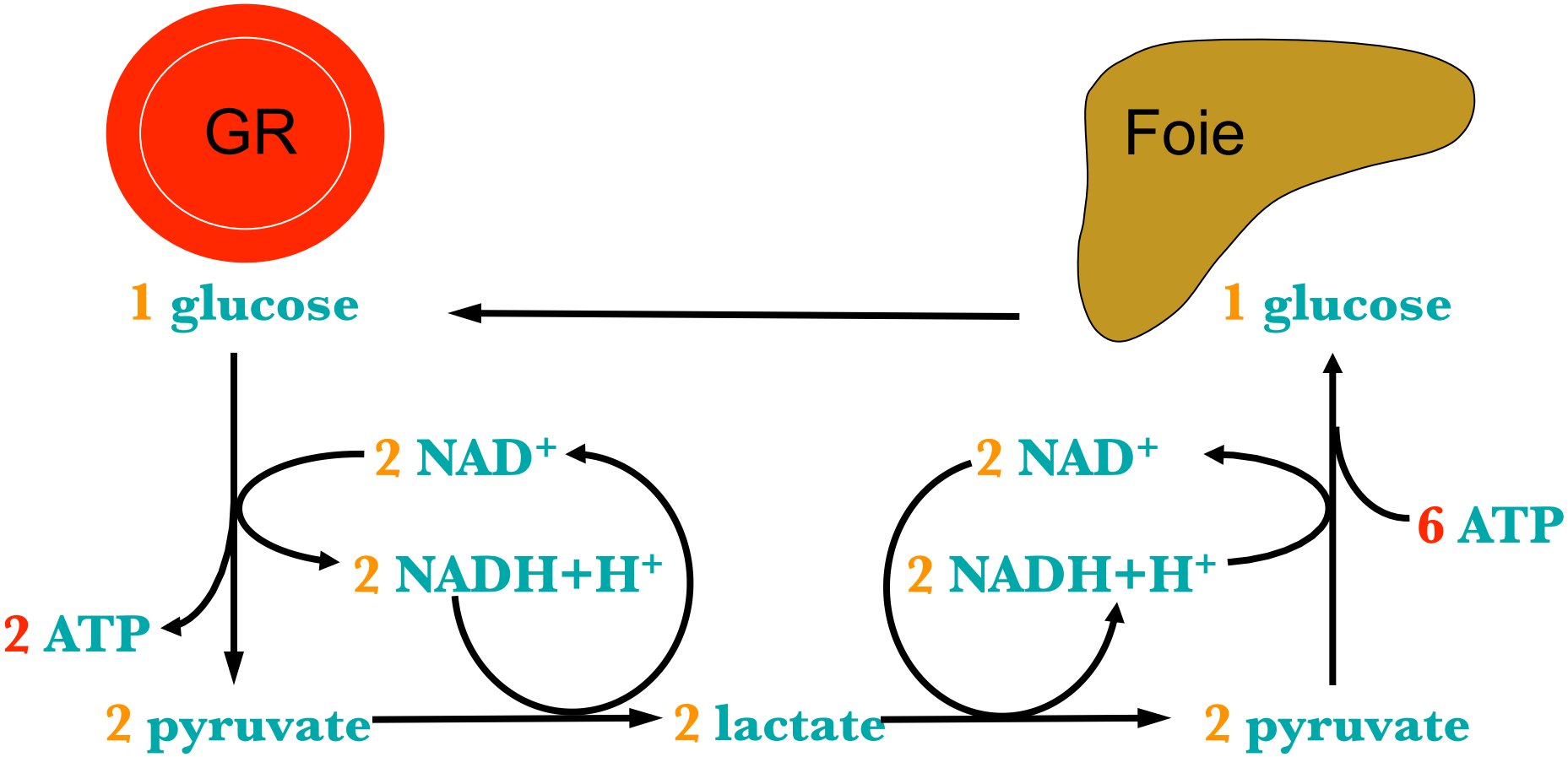
↑

2 pyruvate

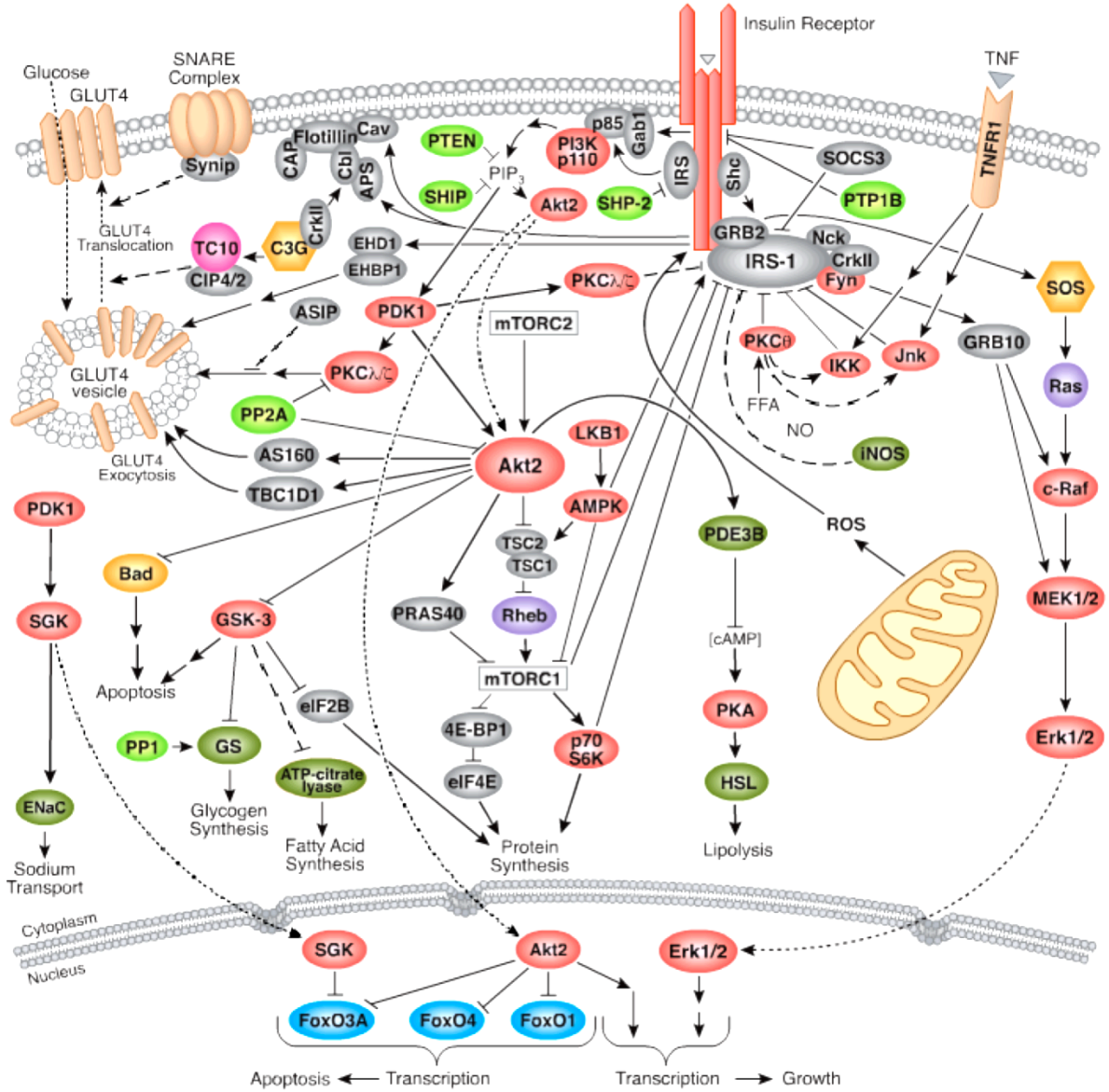
2 NADH + H^+

6 ATP

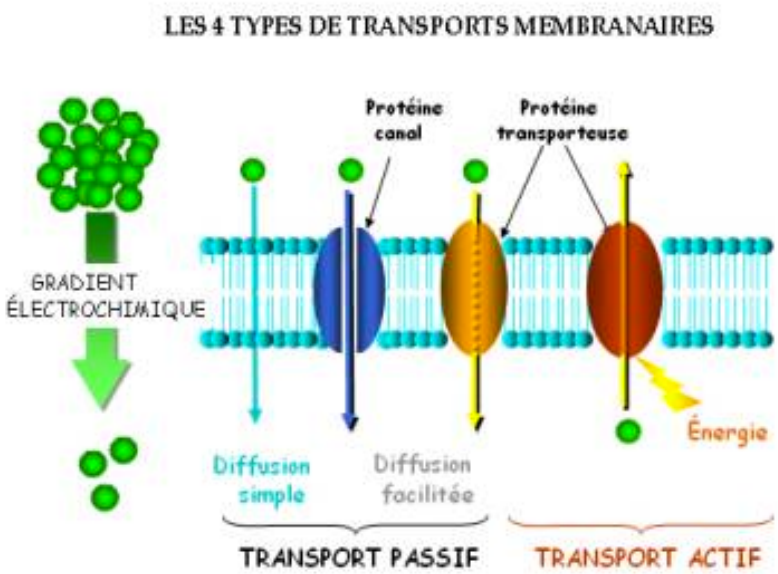
Un cycle pas si futile

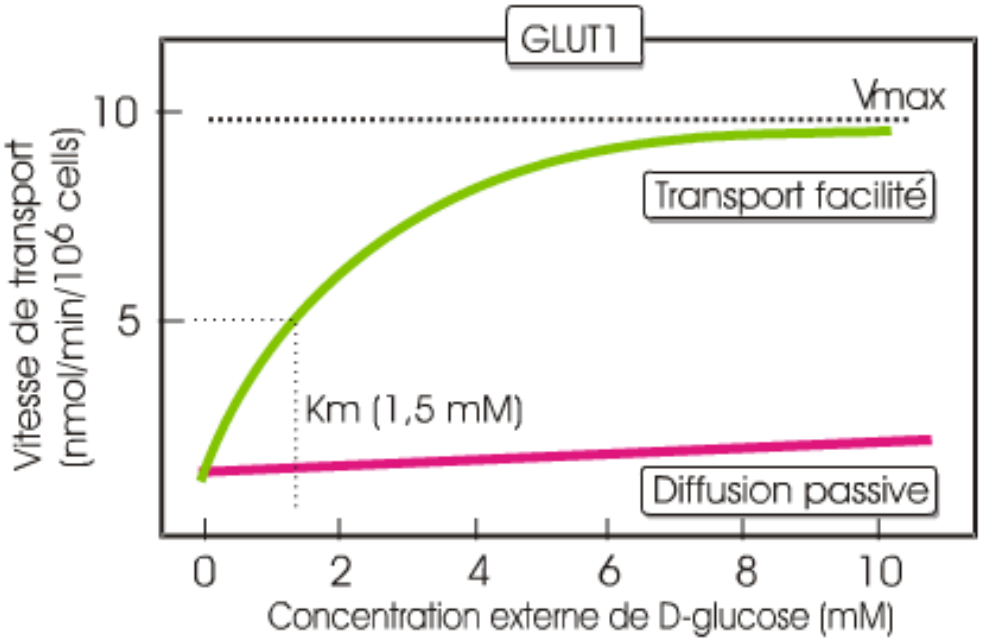


Mode d’action de l’insuline



Transport du Glucose

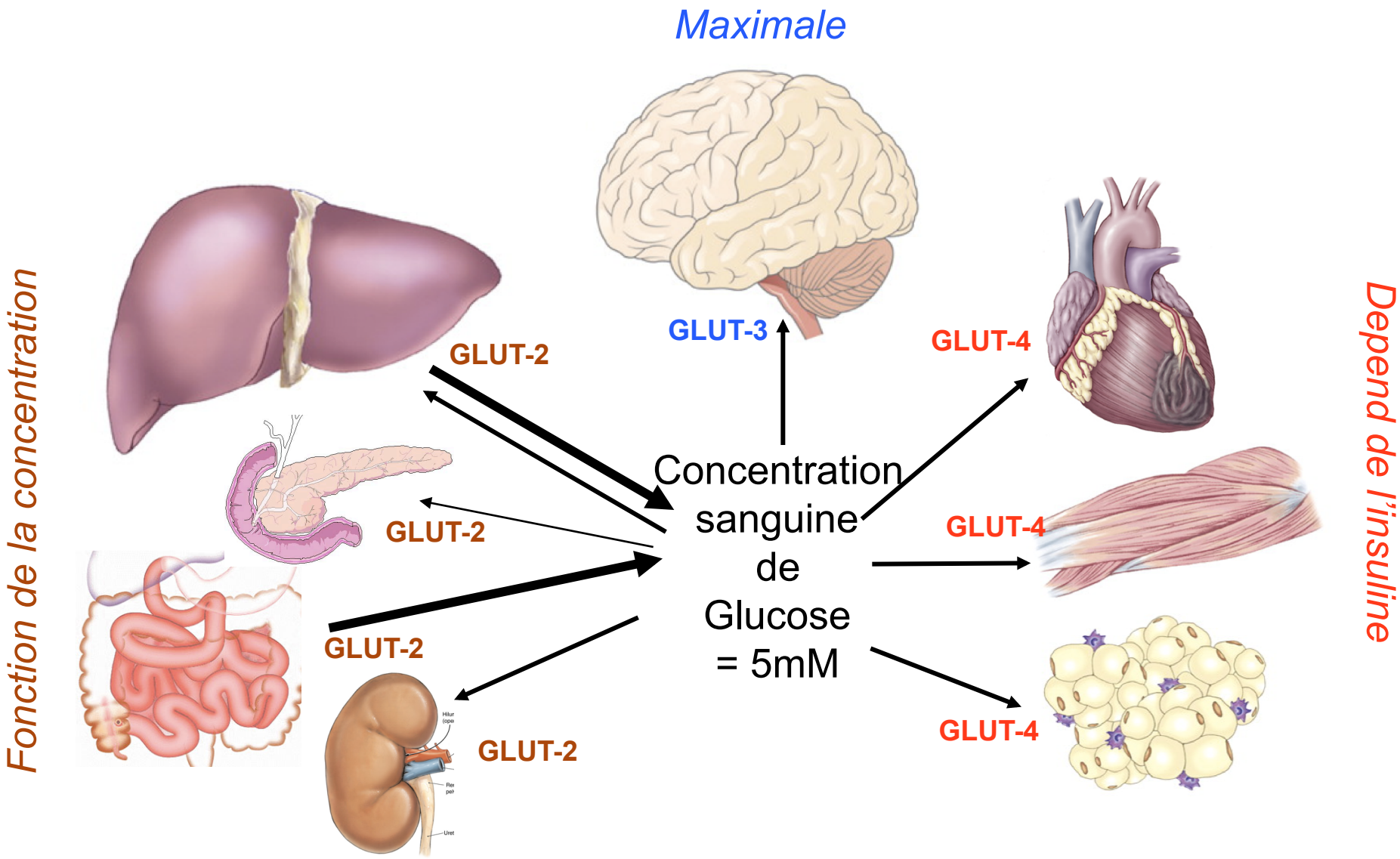




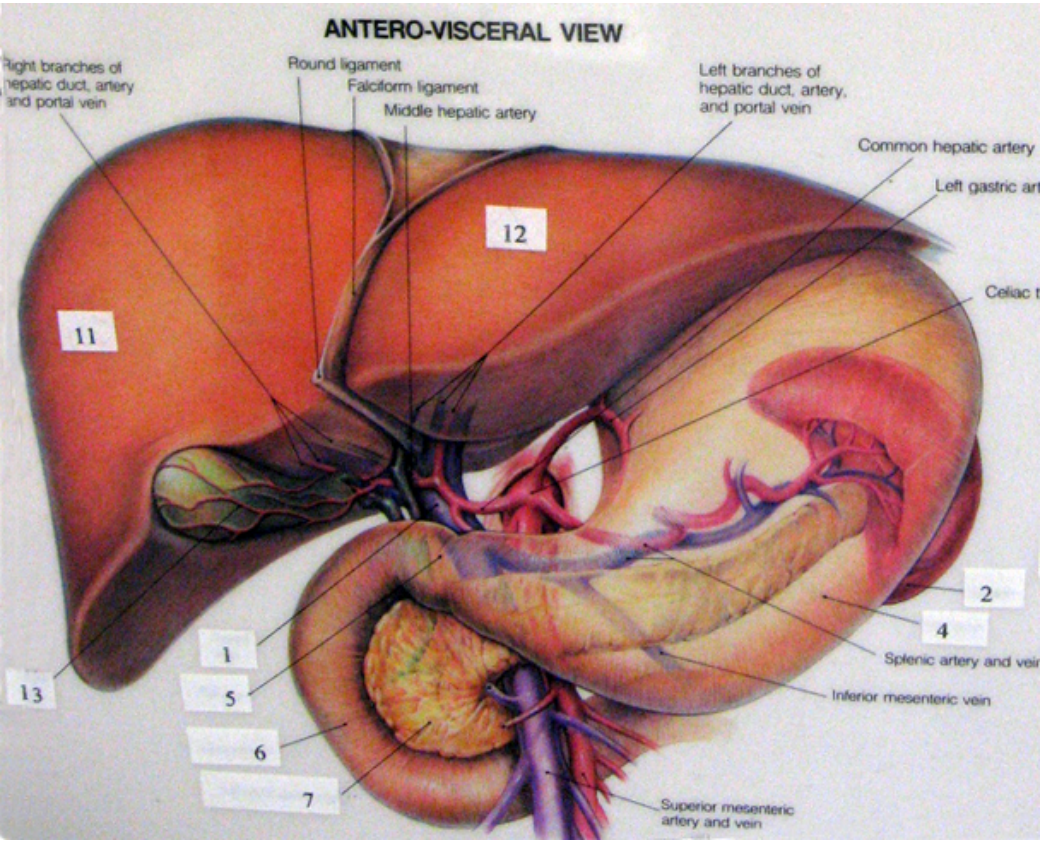
Km = Vmax / 2

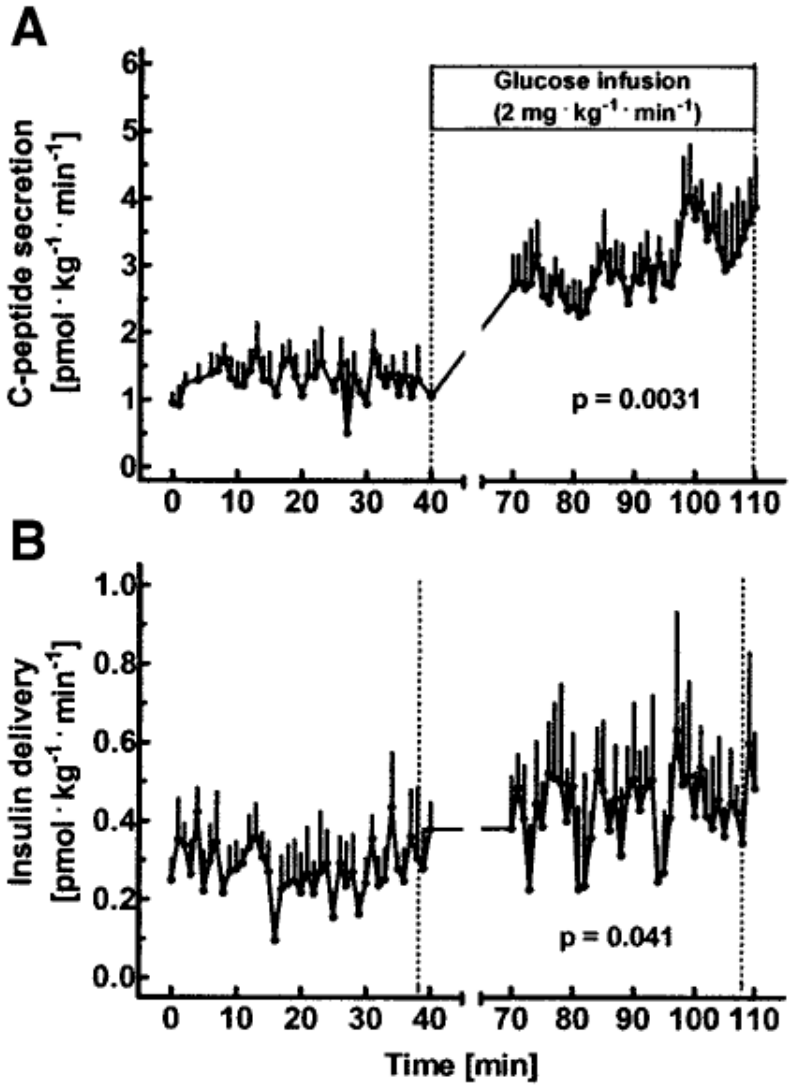
GLUT1 et GLUT3 : Km = 1 mmol/L
GLUT2 : Km = 15-20 mmol/L
GLUT4 : Km = 5 mmol/L ← Insuline

Vitesse d’ entrée du glucose



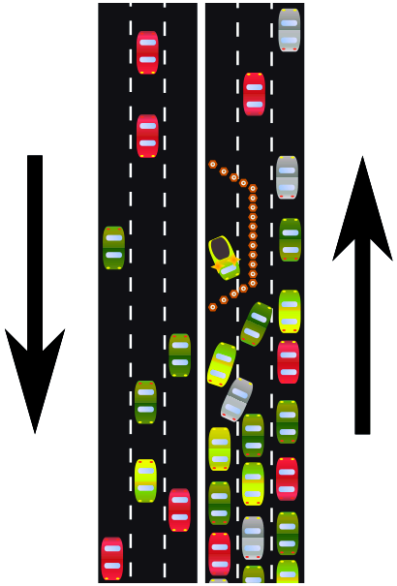
Insuline sans GLUT4 ?

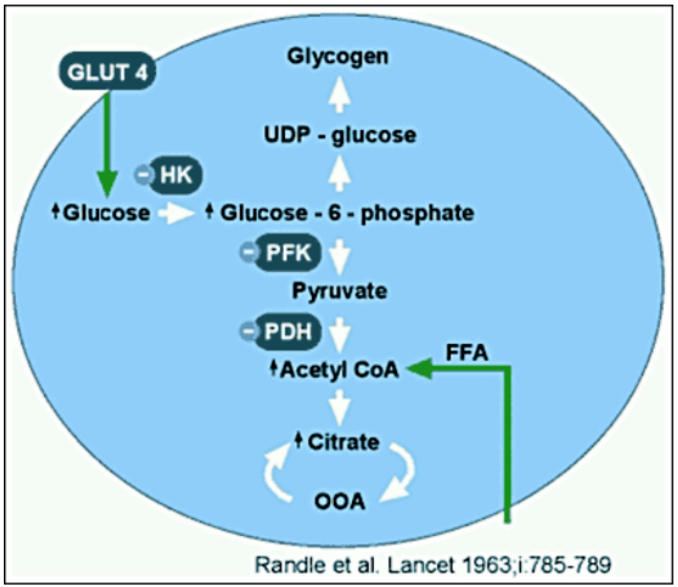


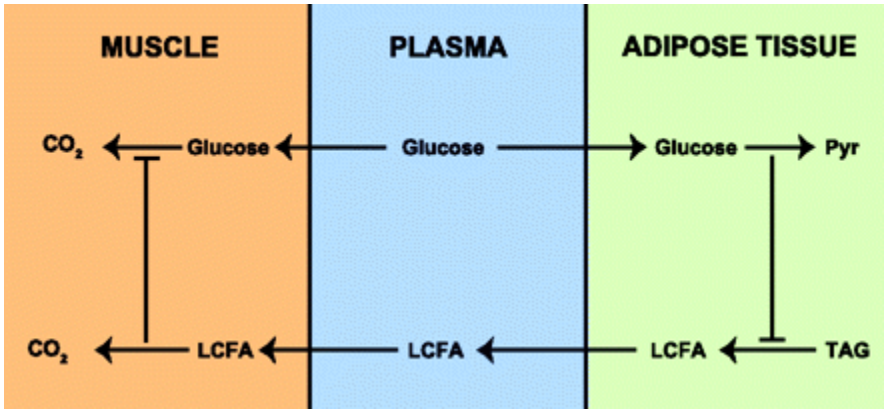


Meier. *Diabetes*, 2005

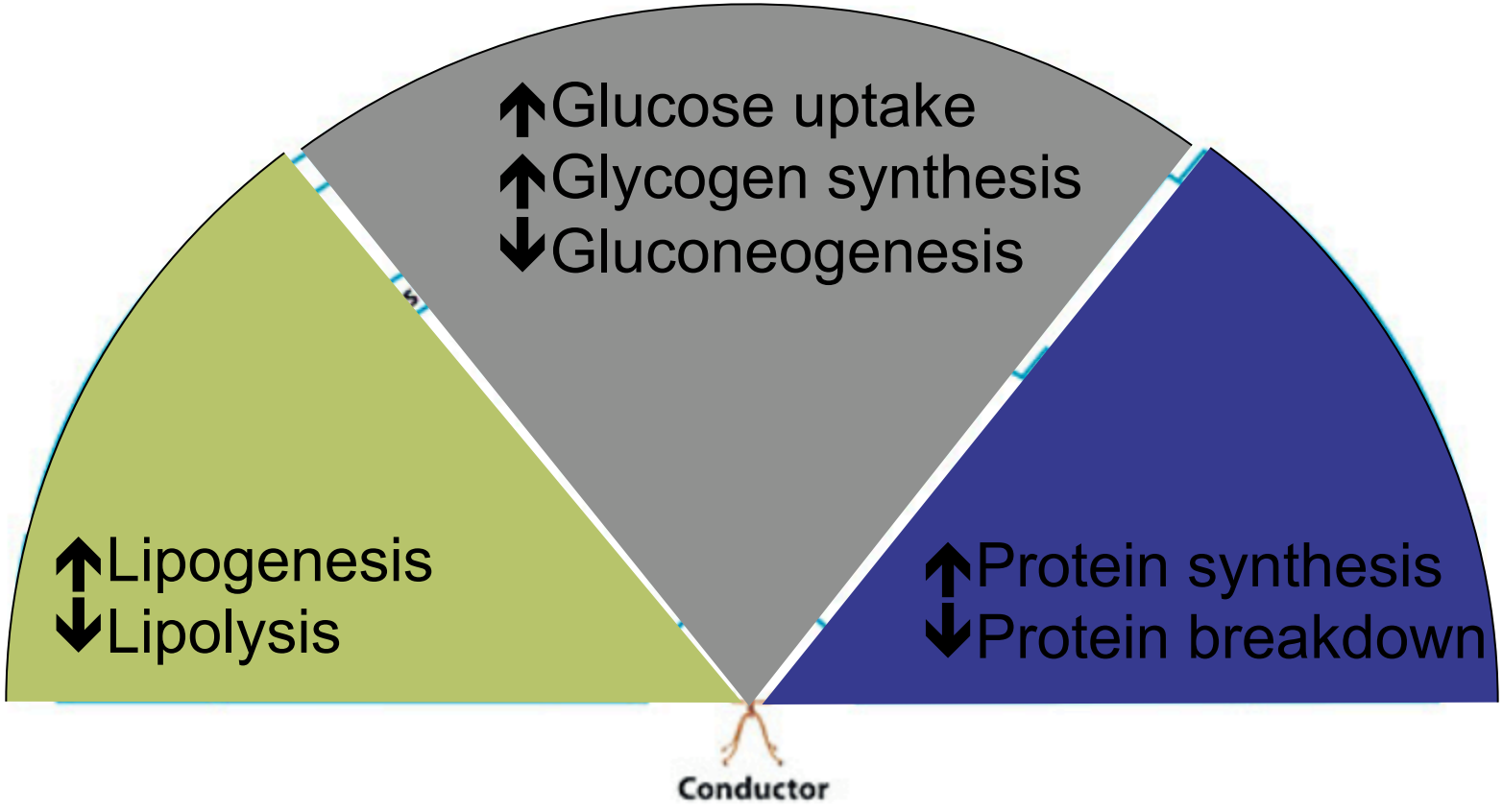
Chaos ou priorités ?





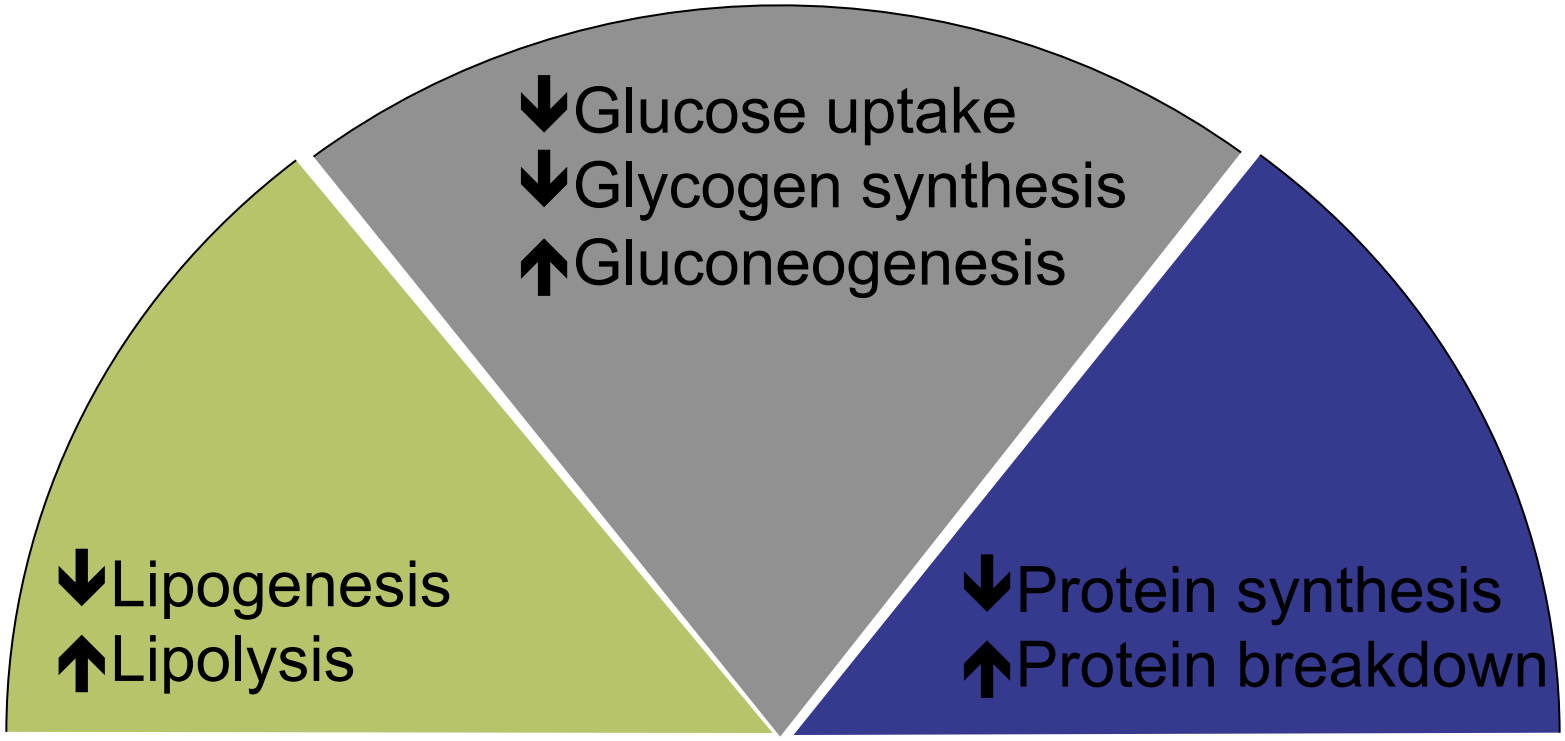


Insuline


↑Glucose uptake
↑Glycogen synthesis
↓Gluconeogenesis
↑Lipogenesis
↓Lipolysis
↑Protein synthesis
↓Protein breakdown
Conductor

Insulino resistance

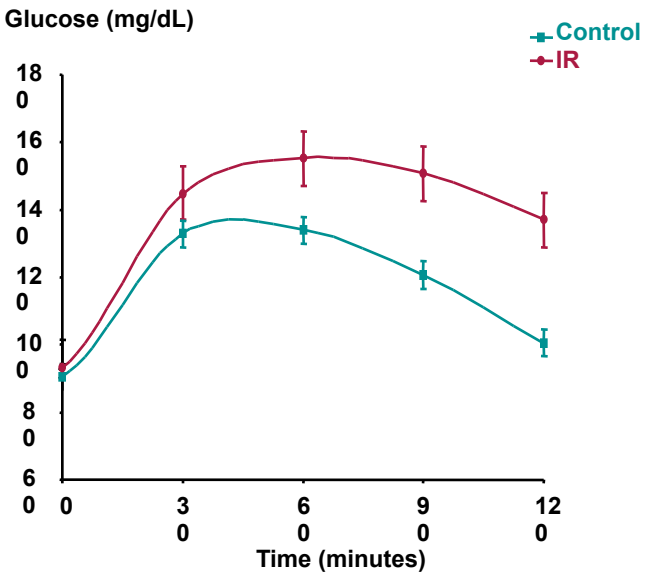
↑Blood Glucose Concentration

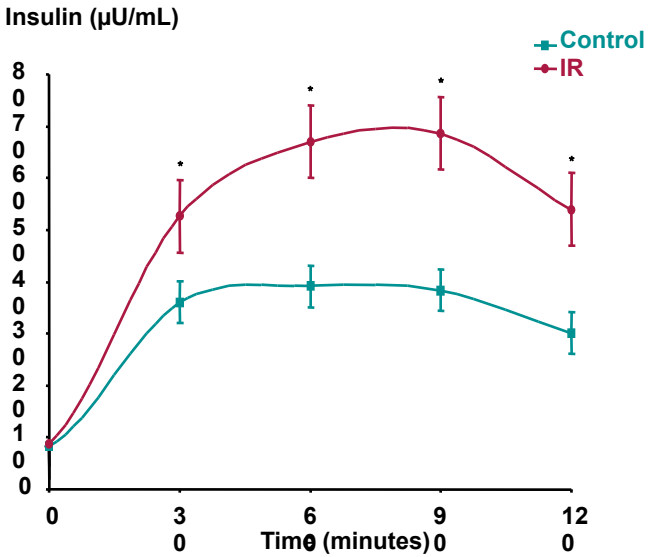


↑Blood FFA Concentration

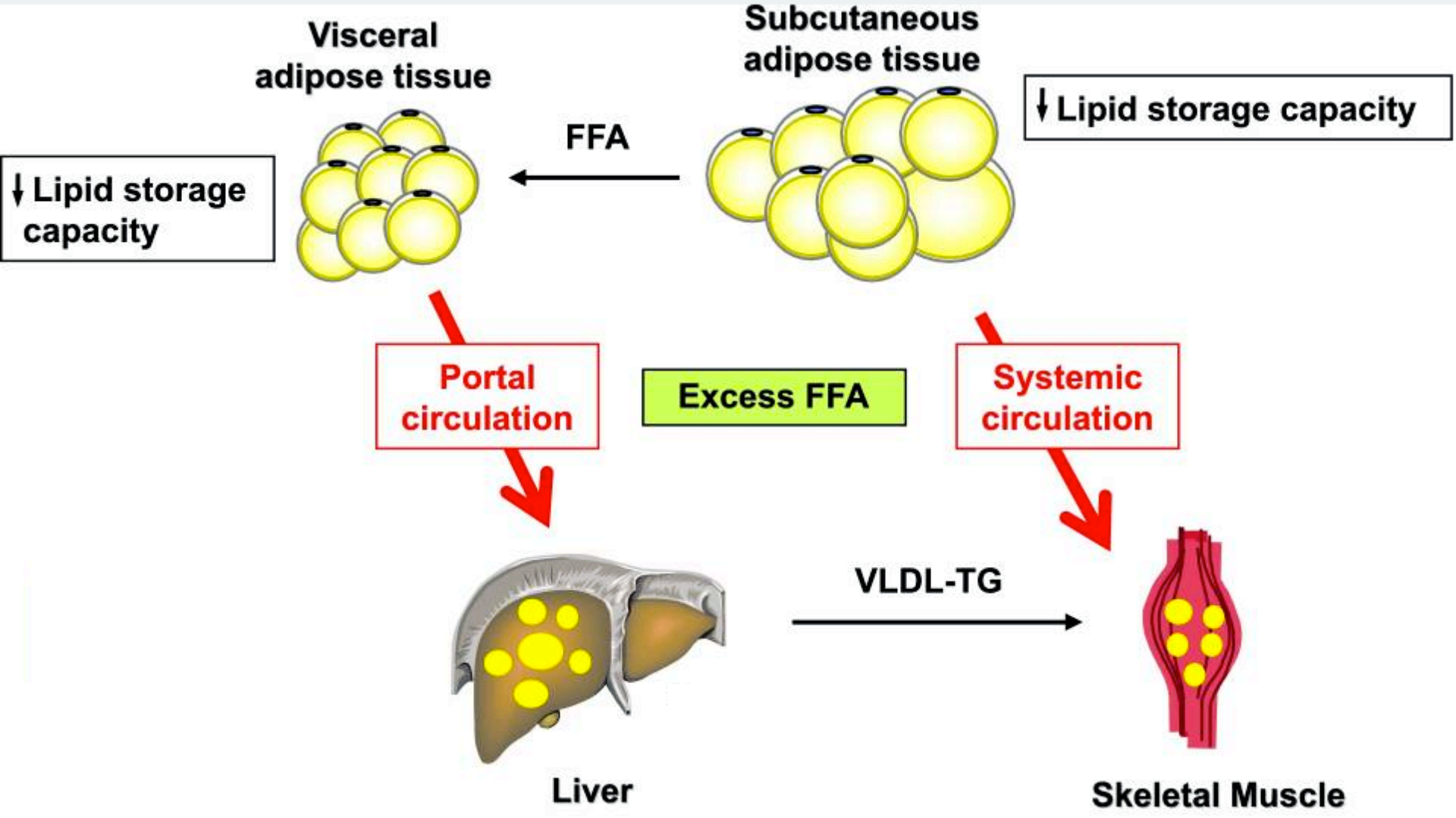
↑Nitrogen excretion

Conséquence sur la glycémie

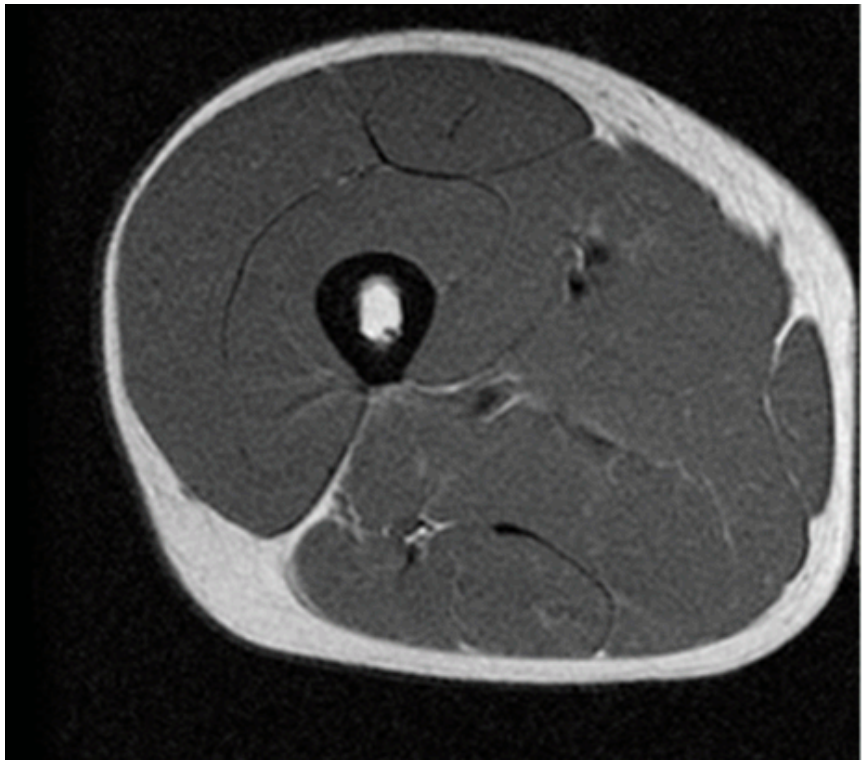


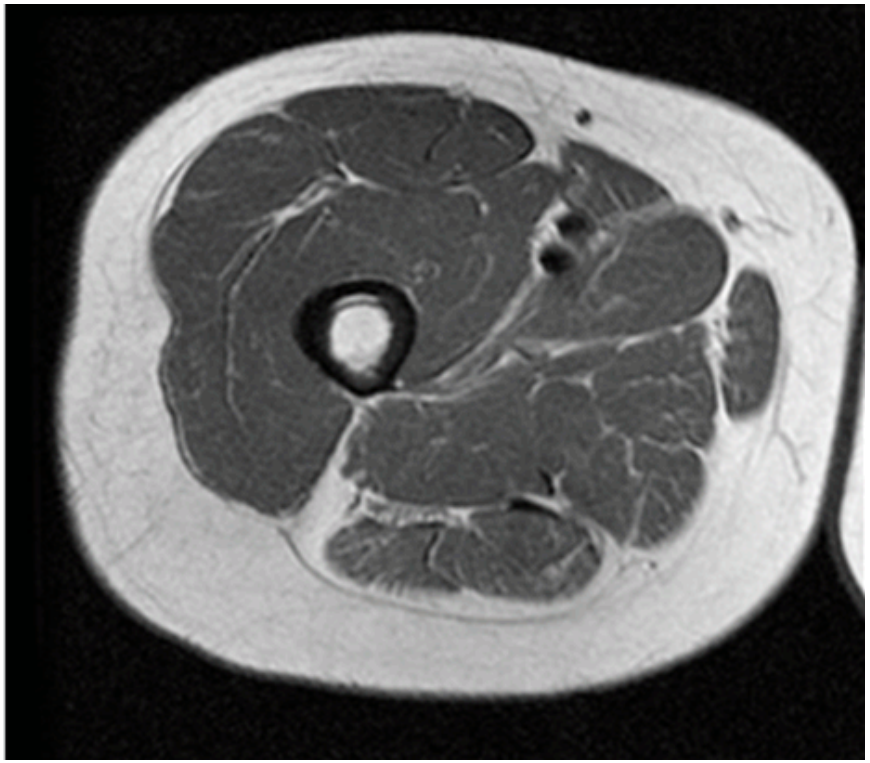


Conséquence sur les lipides



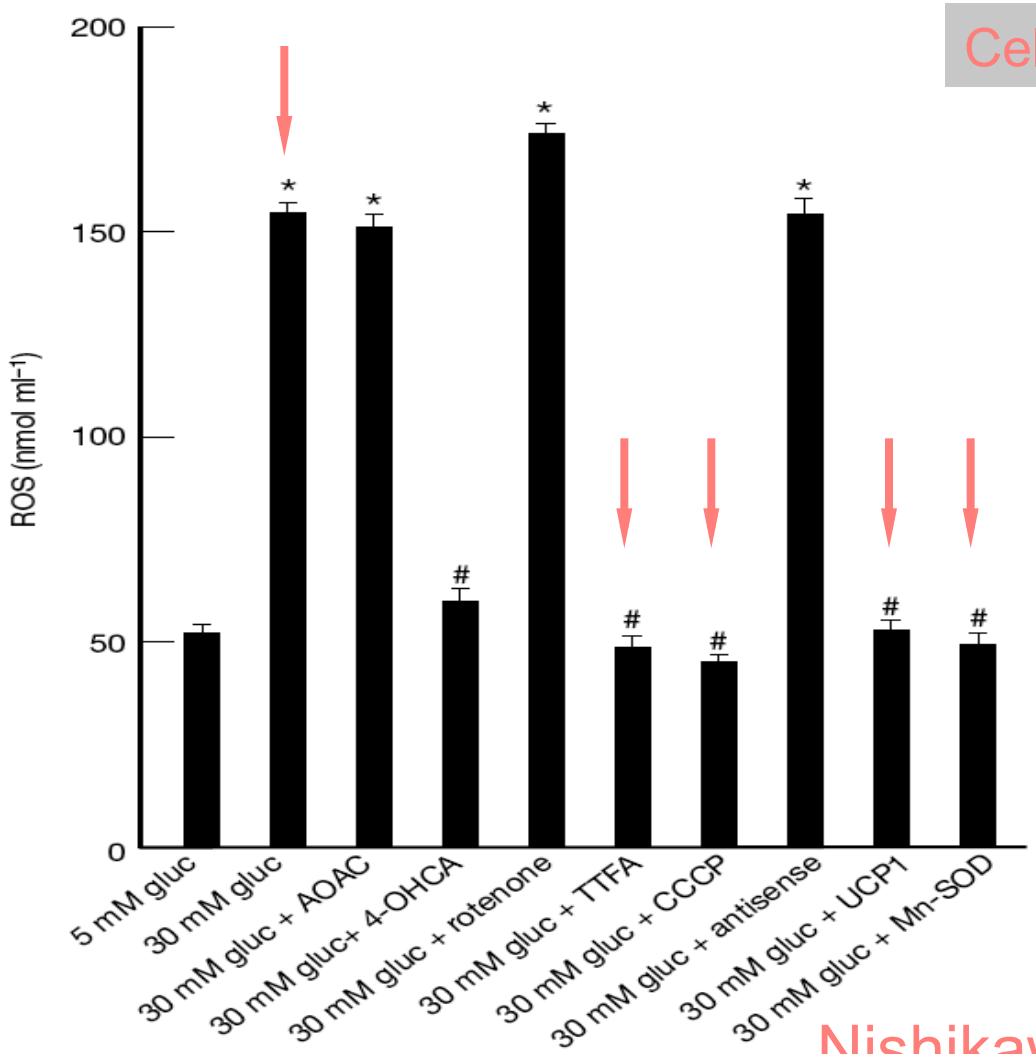
Conséquence sur le protéines





L’ hyperglycémie induit une production de ROS

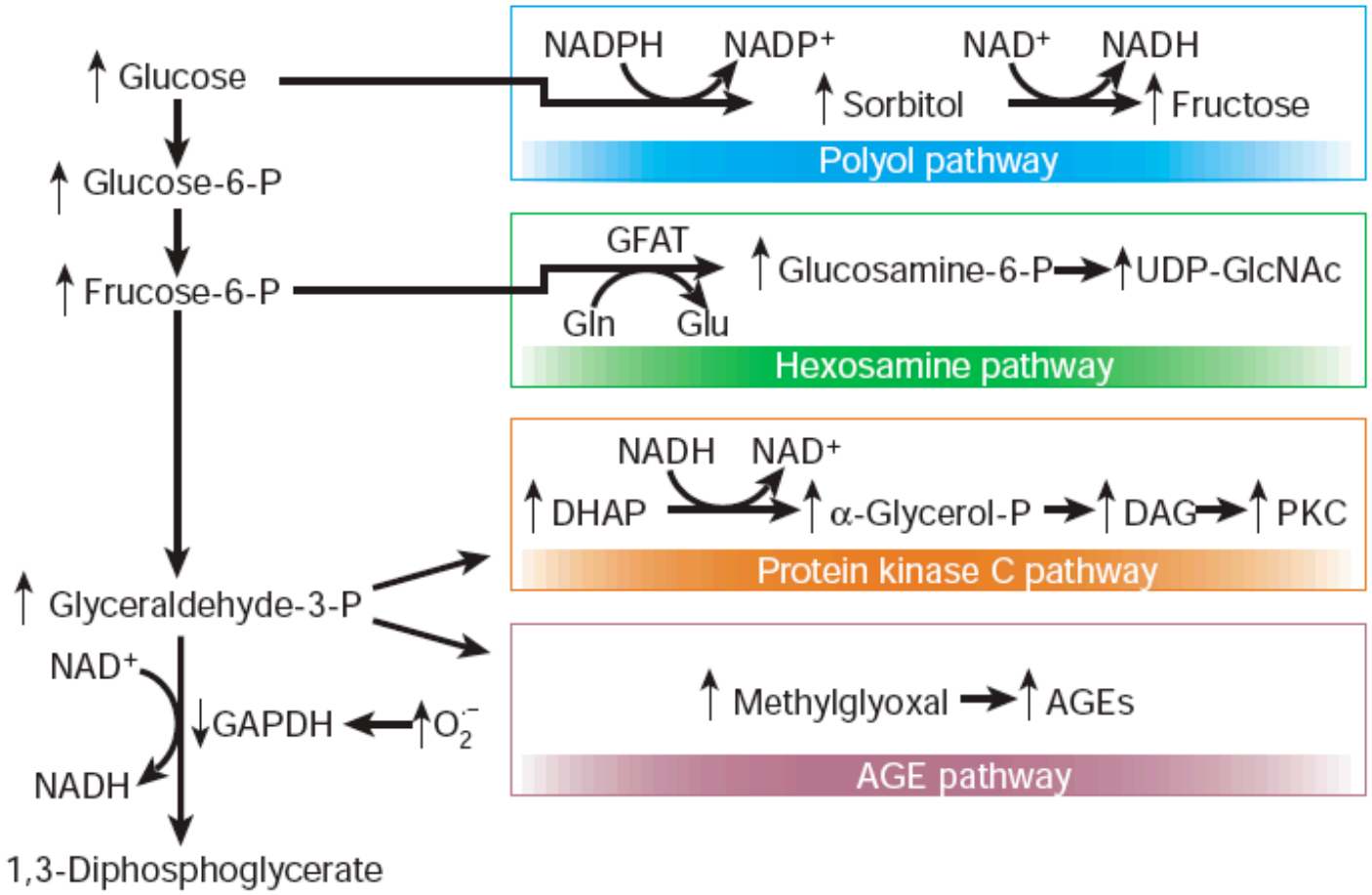
Cellules endothéliales



mitochondries

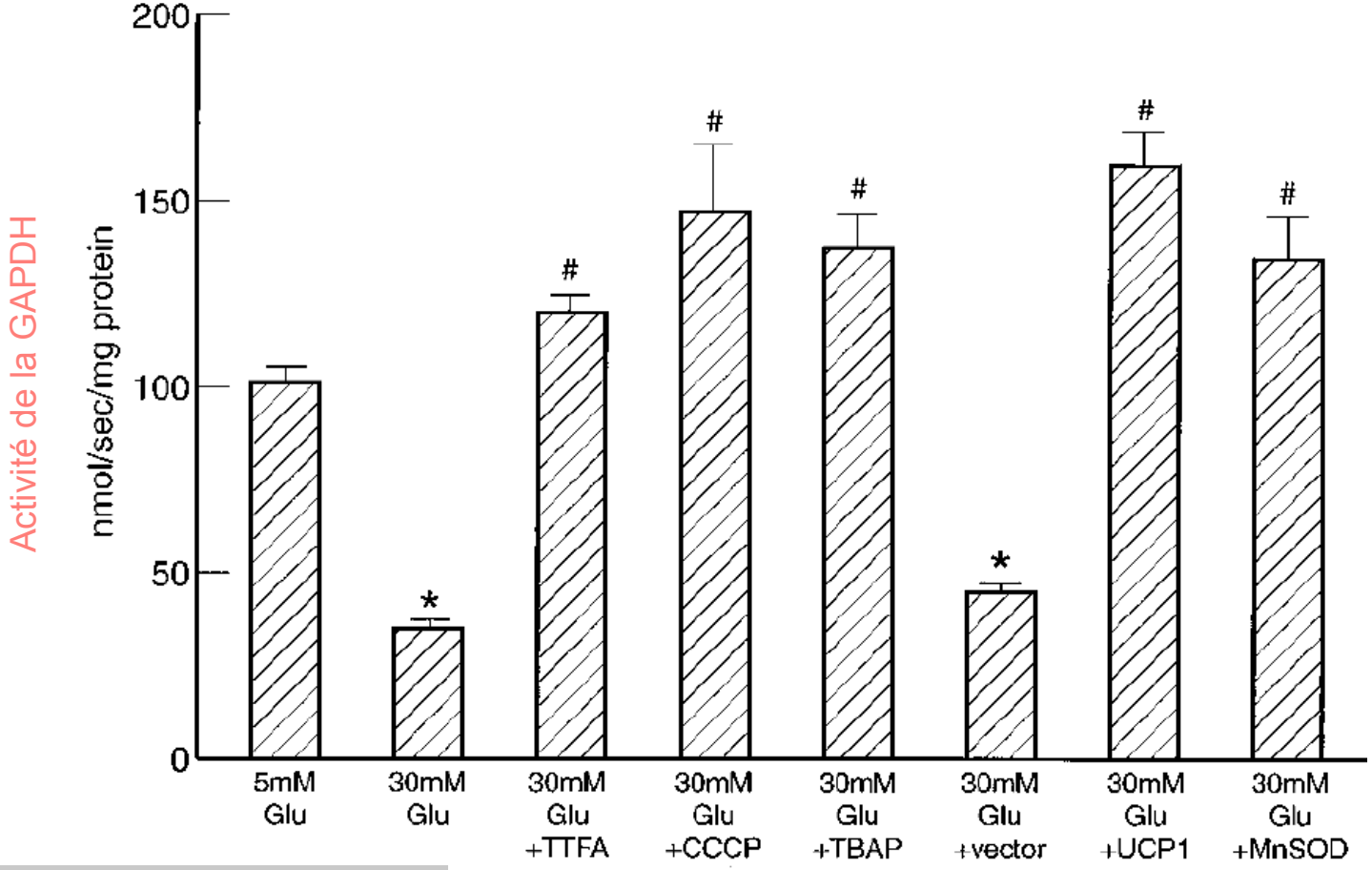
Nishikawa & al. *Nature*, 2000

Inhibition de la GAPDH cause des complication ?



Brownlee. *Nature*, 2001

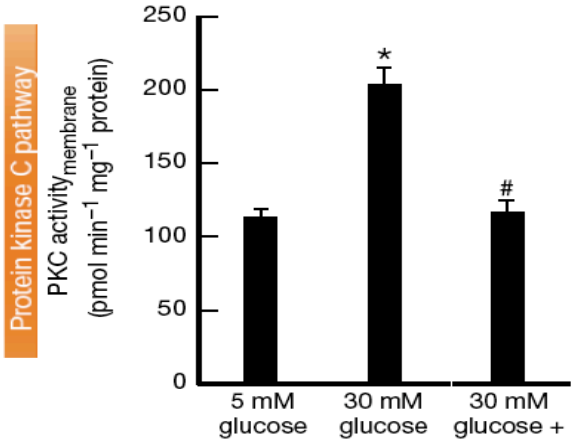
Les ROS inhibent la GAPDH

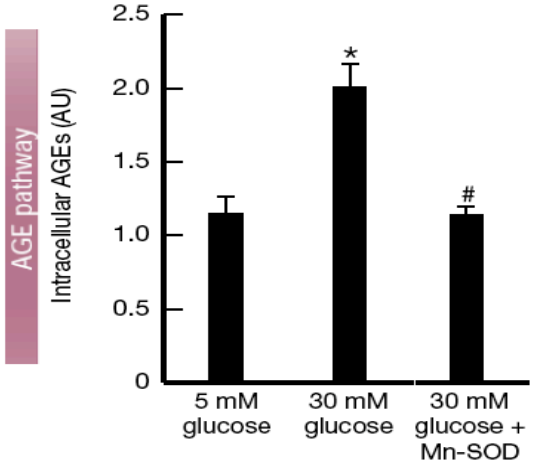


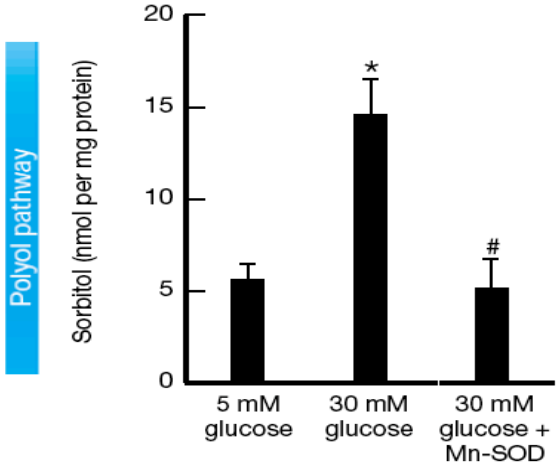
Cellules endothéliales

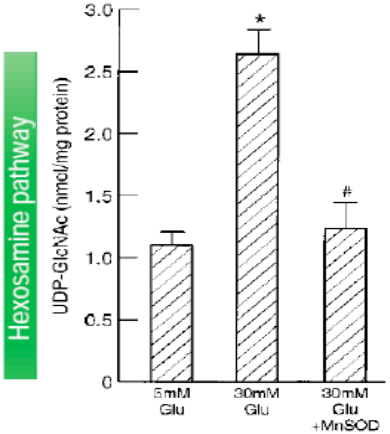
Du & al. *PNAS*, 2000

Démonstration









Cellules endothéliales

Du & al. *PNAS*, 2000
Nishikawa & al. *Nature*, 2000

Merci pour votre attention !